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ABSTRACT

Research findings on effective teaching are being used to identify potential "master teachers." This paper discusses six problem areas with respect to using research results in this manner. The first problem area is the question of whether the concept of "master" is necessarily implied by the concept of "effectiveness." In effect, does knowledge of effective teaching practices provide a logical basis for making judgments regarding teaching mastery? A second problem is the matter of inferring unequivocally that teachers are causing higher or lower student achievement by their observed teaching behaviors and classroom processes. A third problem area pertains to the kind of student growth that researchers tend to investigate. Achievement measures employed in research on teaching often emphasize only the cognitive domain while overlooking the affective domain. A fourth question pertains to the generalizability of research confined to students of only one grade or level. A fifth problem area concerns the frequent assumption that relationships between teaching practice and student achievement are linear. The final problem area is that using the results of research on teaching for identifying master teachers is incongruous with the purpose of this research. (29 references) (JD)

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Effective Teachers and Research on Teacher Effectiveness: The Relevance of Educational Research for Identifying Master Teachers

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EFFECTIVE TEACHERS AND RESEARCH ON TEACHER EFFECTIVENESS: THE RELEVANCE OF EDUCATIONAL RESEARCH FOR IDENTIFYING MASTER TEACHERS

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A shorter version of this paper appeared in the *Journal of Maine Education* (Vol. 1, No. 1, pp. 10-19). I am grateful to Gordon Donaldson, David Fink, David Nichols, and Janet Spector for their helpful comments on drafts of this article.

Professor Coladarci received his Ph.D. in educational psychology from Stanford University in 1980. After three years at the University of Montana, he joined the faculty of the College of Education at UMO where, in addition to his research, he teaches courses in educational psychology and research methodology. Professor Coladarci has coauthored a book on descriptive statistics and has published his research in such journals as *Journal of Educational Psychology, American Educational Research Journal, Journal of Teacher Education, Journal of American Indian Education,* and *Research in Rural Education.*

In Maine, as elsewhere, many educators are tackling the problem of developing master teacher schemes. And, in many cases, these educators are considering the results of research on teaching as a basis, in part, for identifying master teachers. In this paper, I discuss six problem areas with respect to using research results in this manner. I will argue that, while the findings from this research can equip teachers and teacher educators with an invaluable framework for viewing teaching, one should be cautious in transforming these results into criteria for identifying individuals as effective teachers, in general, and master teachers, in particular. At best, there are certain cautions to observe; at worst, such a transformation is inappropriate. Before presenting the six problem areas, I provide an overview of research on teaching and its traditional methodology.

Research on teaching

Research on teaching has long been an active and fruitful area of inquiry in the larger domain of educational research, as is evidenced by the many publications devoted solely to the presentation and synthesis of studies of teaching. Almost a quarter of a century ago, for example, N. L. Gage edited the *Handbook of research on teaching* (Gage, 1963). The second *Handbook* followed a decade later (Travers, 1973). And several months ago the third *Handbook* appeared (Wittrock, 1986), a 987-page volume comprising 35 chapters across a wide range of topics.

We also have *Teacher behaviours and student achievement* (Rosenshine, 1971), *The study of teaching* (Dunkin & Biddle, 1974), and *The scientific basis of the art of teaching* (Gage, 1978) — each book, doubtless, destined for the status of "classic." In addition, a volume edited by Penelope Peterson and Herbert Walberg is forthcoming, which, like their earlier *Research on teaching: Concepts, findings, and implications* (Peterson & Walberg, 1979), will present syntheses of findings from various areas of inquiry in research on teaching.

Another sign of the vitality of research on teaching is the recent creation of an eleventh division in the American Educational Research Association: "Teaching and Teacher Education." Let there be no doubt that research on teaching is alive and well, representing a powerful knowledge base for the practice of education.

Historically, much of the research on teaching has been correlational. That is, measures of teacher behavior and classroom processes have been statistically correlated with measures of student achievement or other student outcomes. On the basis of correlations consistently obtained in research of this kind, researchers have painted rough portraits of the "effective" teacher: general teaching practices and classroom processes that tend to be characteristic of high-achieving classrooms and uncharacteristic of low-achieving classrooms. The brief explanation of correlational methodology that follows will be helpful for understanding the six problems I subsequently discuss. (For those who seek a more detailed treatment of correlations and other descriptive statistics, Coladarci & Coladarci (1980) is *must* reading.)

A correlation coefficient is a statistical index describing the strength of association between two variables, the value of which can range from 0 to a positive or negative 1.00. For example, the correlation is roughly +.30 between (a) performance on the Graduate Record Examination (GRE) and (b) grade point average (GPA) in graduate school (Kingston, Livingston, & Turner, 1982). This correlation indicates that people who do well on the GRE, relative to those who do poorly, subsequently tend to receive higher grades as graduate students.

For an example more relevant to research on teaching, consider Figure 1, taken from a study that Nate Gage and I conducted in the San Francisco Bay Area (Coladarci & Gage, 1984; Gage & Coladarci, 1980). For one part of that study, trained observers went into the classrooms of 28 elementary-level teachers on four occasions throughout the school year. During each classroom visit, observers rated various teacher behaviors and classroom processes on Likert-type scales (e.g., 1 to 5). These individual ratings were then summed, providing a behavior composite (in the form of a single "score") for each teacher over the entire school year. These composites, in turn, were correlated with the average end-of-year academic achievement of each class.

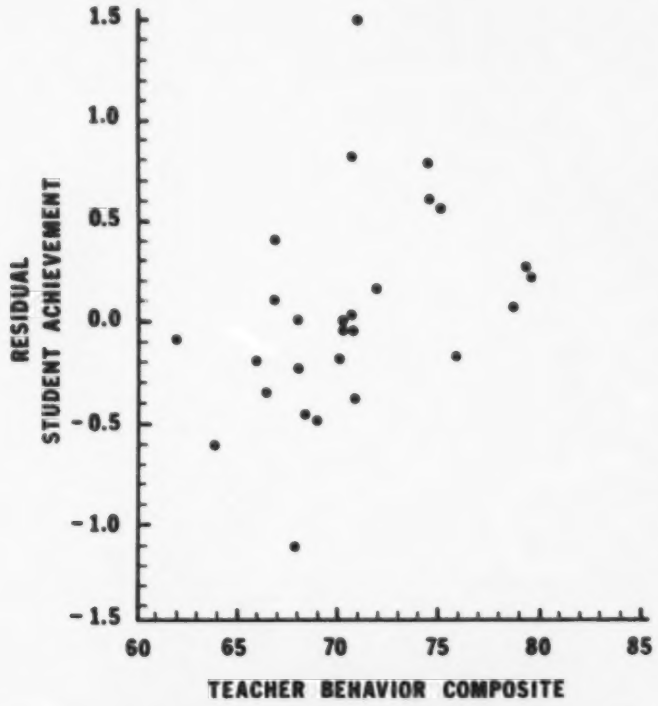

Figure 1. Scatterplot of teacher behavior composite and student achievement: r = +.40 (from Gage & Coladarci, 1980).

The resulting relationship is portrayed by the scatterplot in Figure 1, where each dot, or data point, simultaneously represents (a) a teacher's behavior composite (horizontal axis) and (b) the average student achievement for that teacher's class at the end of the school year (vertical axis). We see that these data points generally scatter from the lower left-hand corner of this figure to the upper right-hand corner: Teachers who were rated high by the observers tended to enjoy higher student achievement at the end of the year than those teachers rated low. Thus, we say there is a "positive" relationship between teacher behavior and student achievement in this instance. (We obtained a correlation of +.40 between those two variables.)

A "negative" relationship, incidentally, would indicate that teachers who were rated high by observers later experienced *lower* student achievement than teachers rated low. The scatterplot in this instance slopes downward rather than upward. In second-grade classes, for example, Soar (1973) obtained a negative correlation of –.49 between (a) the average end-of-year academic achievement of a class (vertical axis) and (b) the degree to which a teacher displayed coercive control methods and negative affect in the classroom (horizontal axis). That is, larger achievement gains were found in classrooms where teachers did *not* display coercive control methods and negative affect (as one would hope!).

Much of what we know about teaching practices and their relationships with educational outcomes stems from methodology of this kind. For example, the rich concepts of direct instruction and active teaching (e.g., Good, 1983; Rosenshine & Stevens, 1986) are rooted in correlational research, as are many of the helpful generalizations regarding effective classroom management (e.g., Brophy, 1983; Doyle, 1986). Furthermore, it is largely to correlational evidence that educators most often turn in their efforts to characterize effective teaching. (See Brophy & Good, 1986, for a recent summary of this research.)

I now turn to six problem areas associated with a particular kind of application of the results from research on teaching: identifying master teachers.

"Master" vs. "effective"

First is a question of definition: Is the concept of "master" necessarily implied by the concept of "effectiveness"? That is, does knowledge of effective teaching practices, as suggested by the results from research on teaching, provide a logical basis for making judgments regarding teaching *mastery?* "Master teacher," to me, connotes a sense of privilege and status — a title conferred upon teachers who have demonstrated an excellence in their professional role beyond mere competence. If by "effectiveness" we mean a teacher's ability to facilitate student growth (within existing constraints), *all* teachers should be expected to be effective. Effectiveness, in short, is a liberal criterion for identifying master teachers.

To complicate matters, "effective" teachers in any one study are effective *relative* to other teachers in that study. As Doyle (1984) argued,

> it is not altogether clear that the effective teachers in classroom studies were, in fact, "master teachers," at least in the sense that they represented absolute standards of teaching excellence. It is perhaps more accurate to say that they were relatively more effective than their colleagues in a particular sample. Whether the more effective teachers *across studies* represent a heterogeneous or homogeneous group has never been determined. In other words, could Brophy's teachers have out-taught Good's teachers? (pp. 55-56; emphasis in original)

The issue here is analogous to the problem of interpreting norm-referenced test scores (e.g., SRA). While a high score on the SRA tells us that the student out-performed the majority of other examinees on this test, we are considerably less certain in our judgments of this student's capabilities in a peer-independent, objective-referenced, sense.

Causal ambiguity

The logic of a correlation coefficient brings us to a second problem area. Specifically, in interpreting correlational evidence, we must always honor the dictum, "correlation does not imply causation." From a correlation such as that portrayed in Figure 1, we cannot infer unequivocally that teachers are *causing* higher — or lower — student achievement by virtue of their observed teaching behaviors and classroom processes. An experiment, not a correlation, is required to support inferences of that kind. And even if there were a causal relationship between the two variables in question, a simple correlation coefficient is mute on the question of which is cause and which is effect. Teacher enthusiasm, a topic that once enjoyed considerable research attention, serves as a case in point. Rosenshine and Furst (1973) summarized the existing research at that time:

> The teacher's enthusiasm has been studied primarily through observer ratings on paired adjectives such as "dull versus stimulating," observer estimation of the teacher's "vigor and power," and student ratings of the teacher's involvement or excitement in the lesson. Such variables were found to be significantly related to . . . pupil growth [in academic achievement]. (p. 156)

The obvious question is, who is influencing whom? Is it the stimulating, powerful, and vigorous teacher who, by virture of these characteristics, shapes the academic achievement of the students? Or is it the characteristics of academically successful students that *elicit* these observed qualities in the teacher? Fortunately, most researchers compute correlations in a way that renders the first interpretation considerably more plausible than the second. A less obvious question is, How confident are we that "enthusiasm" is the teacher variable most relevant here? Perhaps the enthusiastic teachers in these studies also would have been rated high on some other factor that *itself* is causally related to student achievement, such as the teacher's subject matter knowledge or classroom management skills. Teacher enthusiasm, in other words, actually might be inconsequential as an influence on student achievement. Rather, its correlation with student achievement simply might reflect the fact that enthusiasm also is related to an unexamined, yet very real, cause of student achievement. Clearly, it would be the other variable, more than teacher enthusiasm, that deserves a place in our characterizations of effective teaching.

By no means, however, does this gainsay the practical import of correlational evidence. First, experiments based on hypotheses derived from correlational results generally have established modest, yet consistent, cause-effect relationships between general instructional models and student achievement (see Gage, 1985, for a description of these experiments). Second, irrespective of experimental corroboration, correlational evidence provides a critical basis for *speculating* about causal relationships concerning learning and instruction in the classroom. And such speculation arguably is a prerequisite for a thoughtful, deliberative orientation toward teaching, rather than a mechanistic, technological one (Zumwalt, 1982).

Nonetheless, the causal ambiguity of correlations requires that consumers of research be especially critical when examining research findings of this kind. Does it seem plausible, for example, that in any one correlational study a *causal* relationship exists? If so, does one

direction of influence appear more plausible than the other? Have any important variables been neglected? If so, in what way might these omitted variables be related to the variables that were included in the research? How might this alter our interpretation of the reported results and the implications for practice that we formulate? Like those who conduct research, consumers of research must engage in theorizing of their own.

Measures of student outcomes

A third problem area pertains to the kind of student growth that researchers tend to investigate. Specifically, achievement measures employed in research on teaching often emphasize the cognitive domain of educational outcomes. The affective side of teachers' effects on students, such as the development of positive attitudes toward learning, typically take a back seat to the acquisition of basic skills in reading and mathematics. Thus, the effective teacher, based on the results of educational research, is "effective" within the context of a specific — narrow, some might argue — set of criteria. To be sure, these criteria represent what most of us would agree are the more important products of education. Yet, there *are* educational fruits other than reading, 'riting, and 'rithmetic.

Further, there is evidence that what promotes cognitive outcomes does *not* necessarily promote these other outcomes. For example, Peterson (1979), in her review of research in which the effects of "direct" and "open" instruction were compared, reported that direct instruction generally was associated with higher student achievement in reading and mathematics but *lower* achievement of affective outcomes such as the student's self-concept, attitude toward school, attitude toward teacher, curiosity, and independence. Further, open instruction generally was associated with lower achievement in reading and mathematics but higher achievement of these affective outcomes. The moral is simple: In considering the results from research on teaching for any practical application, educators must carefully evaluate the degree to which the outcome measures employed in any relevant study reflect the educational objectives in the application setting.

Context

Much of the research on teaching, such as the influential large-scale correlational studies of the 1970s (e.g., Brophy & Evertson, 1974; McDonald & Elias, 1976; Soar, 1973; Stallings & Kaskowitz, 1974), has been carried out in the early to middle elementary grades. The problem is one of generalizability. Are the results from research on, say, fourth-grade mathematics instruction equally applicable to instruction in fourth-grade, eighth-grade, and twelfth-grade classrooms? Of course not. But at what point does generalizability become a problem? On the one hand, findings from research are not rigidly grade-bound. Results from research on fourth-grade mathematics instruction are not irrelevant to teachers of other grades. Yet, pedagogy and classroom life vary so from kindergarten to the senior year of high school that it is only sensible to assume that there are limits to the generalizability of research on any one grade.

The cultural context in which research on teaching is conducted similarly imposes a constraint on the generalizability of findings. Studies vary, for example, in the socioeconomic

status (SES) of the students represented. Furthermore, some teaching practices that correlate positively with academic achievement among high SES students have been found to correlate *negatively* with achievement among low SES students (eg., Brophy & Evertson, 1974). Practical implications regarding these teaching practices, therefore, must be tailored to the student population in mind.

In Maine, a largely rural state, one must address the applicability of the findings from studies conducted in nonrural settings. A current example is the school effectiveness literature, where many of the characterizations of "effective schools" are based on research conducted in urban, inner-city, schools (e.g., Edmonds, 1979). Whether our concern is one of grade or culture, we must conduct a careful analysis of the research itself, as well as the context to which the research is to be applied, in order to determine the limits of generalizability and the corresponding implications for practice.

Linearity

A fifth problem area concerns the frequent assumption that relationships between teaching practices and student achievement are linear. Consider, again, Figure 1. Because of the positive correlation between the two variables, it can be said that teachers who have a high behavior composite tend to have students high in end-of-year academic achievement (as well as the converse). With any correlation, we must consider the *range* of data on which the correlation is based. In the case of our study, for example, the lowest and highest behavior composites were roughly 62 and 80, respectively. It is within *this* range that we obtained a correlation of .40. Would one expect, other things being equal, that a teacher with a behavior composite beyond this range — say, 90 — would have students higher on end-of-year academic achievement than the teacher with the behavior composite of 80? What about a teacher with a behavior composite of 95, or 100?

The truth is that we simply do not know, because no teachers in our study had behavior composites of those values. Unless there is other research that (a) employed methodology similar to ours and (b) included teachers with behavior composites of those high values, it is difficult to say with any confidence that the overall relationship between teacher behavior and student achievement would continue to be linear. Perhaps student achievement would begin to *drop*, rather than continuing to rise in a linear fashion, in the classes of teachers exceedingly high in this behavior composite.

This point carries important practical implications. Consider the concept of academic engagement, which has received considerable attention among researchers and teachers alike. Teachers who keep their students engaged in relevant academic tasks have been found to enjoy higher student achievement than teachers who do not (Fisher et al., 1978; also see Fisher & Berliner, 1985). But, knowing this and then observing a number of teachers in a local district, can we conclude that the teacher who we observe to command the highest academic engagement in the classroom is therefore the most effective teacher — a candidate, maybe, for master teacher status? Perhaps this teacher actually is *undermining* academic achievement because, with such high engagement, students are becoming cognitively fatigued. "Too much of even a generally good thing," as Brophy and Good (1986, p. 366) say, "is still too much."

Certainly our intuition tells us that academic engagement and student achievement are linearly related *up to a point* and, after this point, any increase in the academic engagement of students would be associated with a leveling-off of student achievement or, worse, a decrease in achievement. Thus, in more formal terms, we most likely would posit a *curvi*linear relationship between academic engagement and student achievement. Intuition notwithstanding, research on the curvilinear nature of this relationship — and, in this respect, most teaching-learning relationships — is meager. Consequently, it is for the consumer of research on teaching to judge whether any conclusion, inference, recommendation, or policy implication based on the results of research is, in effect, "going beyond the data."

The purpose of research

In my discussion so far, I have pointed to cautions that we should observe when examining the results of research on teaching for practical implications. And these caveats hold irrespective of one's objective — whether it is to inform the education and practice of teachers or, more specifically, to identify master teachers. The final problem area that I present is, in my view, of a more serious kind for identifying master teachers. Quite simply, using the results of research on teaching for identifying master teachers is incongruous with the purpose of this research.

These results are not intended to equip educators with a mechanism for identifying teachers who are effective, such as cardiovascular research permits the identification of patients who are at risk. Rather, research on teaching is conducted for a less prescriptive and, I believe, more important, purpose. Such research provides educators with a critical basis for thinking about general relationships between classroom processes and student outcomes, about pedagogical options and their possible consequences. "We conduct research in a field to make sense of it," says Shulman (1986, p. 3), "to get smarter about it, perhaps to learn how to perform more adeptly within it."

Clearly, both teachers and teacher educators can benefit considerably from research on teaching. For the teacher, this can mean an important framework for (a) considering various instructional procedures and classroom management practices, (b) forming hypotheses regarding the outcomes of one's actions (e.g., why an instructional episode did not go as well as expected, why a behavioral reprimand did not have the intended effect), or (c) evaluating the barrage of practical recommendations that teachers are asked to consider from inservice workshops, university classes, visiting disciples, and so on.

For the teacher educator, results from research on teaching represent a rich and necessary body of knowledge for developing preservice programs. Just as schools of medicine place a high value on the findings from medical research in shaping the content of their programs of study (irrespective of whether the medical student plans to be a practitioner or a researcher), schools of education should consider it their professional responsibility to incorporate into their teacher education programs the import of educational research.

But using these results for identification purposes is a different kind of application altogether. Such an application violates the warranty, as Doyle (1984) phrased the problem. For as strong and consistent as many of the findings are, they nonetheless are *statistical*

tendencies. For example, the teacher who frequently monitors students while they are engaged in individual seatwork tends to experience higher end-of-the-year student achievement than the teacher who does not (e.g., McDonald & Elias, 1976; Stallings & Kaskowitz, 1974). The strength and consistency of this finding notwithstanding, there always will be teachers in any study who, despite laudable monitoring behaviors, have disappointing achievement results. Perhaps these teachers are monitoring students in an untimely or otherwise inappropriate fashion. Conversely, there will be teachers who bring about healthy achievement gains in the absence of frequent monitoring. These teachers might nurture student growth by other means, which compensates for their infrequent monitoring. Perhaps their students' conduct or the organization of their classroom is such that frequent monitoring is unnecessary or inappropriate. With variables that correlate moderately, as in research on teaching, there are many exceptions to the rule.

This point is illustrated in Figure 1. Even though the teacher behavior composite correlates +.40 with student achievement, there is considerable scatter around this positive, linear trend. Consider the data points directly above the 70-75 interval on the teacher behavior axis. Despite these teachers' similarity in their observed classroom behavior, they differ markedly in the level of student achievement realized at the end of the year. Again, there are many exceptions to the rule.

And this is true for any correlational evidence. While this state of affairs does not lessen the practical import of research on teaching for the teacher or teacher educator, it introduces a considerable risk for anyone who wishes to single out individuals, on the basis of this research, as effective or "master" teachers. Such a practice would require the untenable assumption that *all* effective teachers — and *only* effective teachers — would be identified (Doyle, 1984).

Summary

The strong and consistent relationships uncovered by years of research on teaching make good grist for the preservice and inservice teacher-education mill. Educators on all fronts — the classroom, the administrator's office, and the halls of academe — should acknowledge the wealth of information that such research represents for the education and practice of teachers. However, I believe that it is inadvisable to use this knowledge as a basis for identifying master teachers. This is not to say that results from this research are devoid of implications for master teacher schemes. But the utility of findings from research on teaching will be evident more in their influence on the general spirit and flavor of a particular master teacher scheme, than in providing a mechanism for identification.

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